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Kim et al.

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(54) **DISPLAY DEVICE**

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CPC ***G06F 1/1616*** (2013.01); ***G06F 1/1626*** (2013.01)

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CPC G06F 1/1616; G06F 1/1626; G06F 1/1637; G06F 1/1641; G06F 1/1681
See application file for complete search history.

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(57) **ABSTRACT**

A display device includes a display module including a first region, a second region and a third region arranged in order; a first plate corresponding to the first region of the display module; a second plate corresponding to the third region of the display module and spaced apart from the first plate at the second region of the display module; and a cover film attached to the first plate and the second plate.

19 Claims, 9 Drawing Sheets

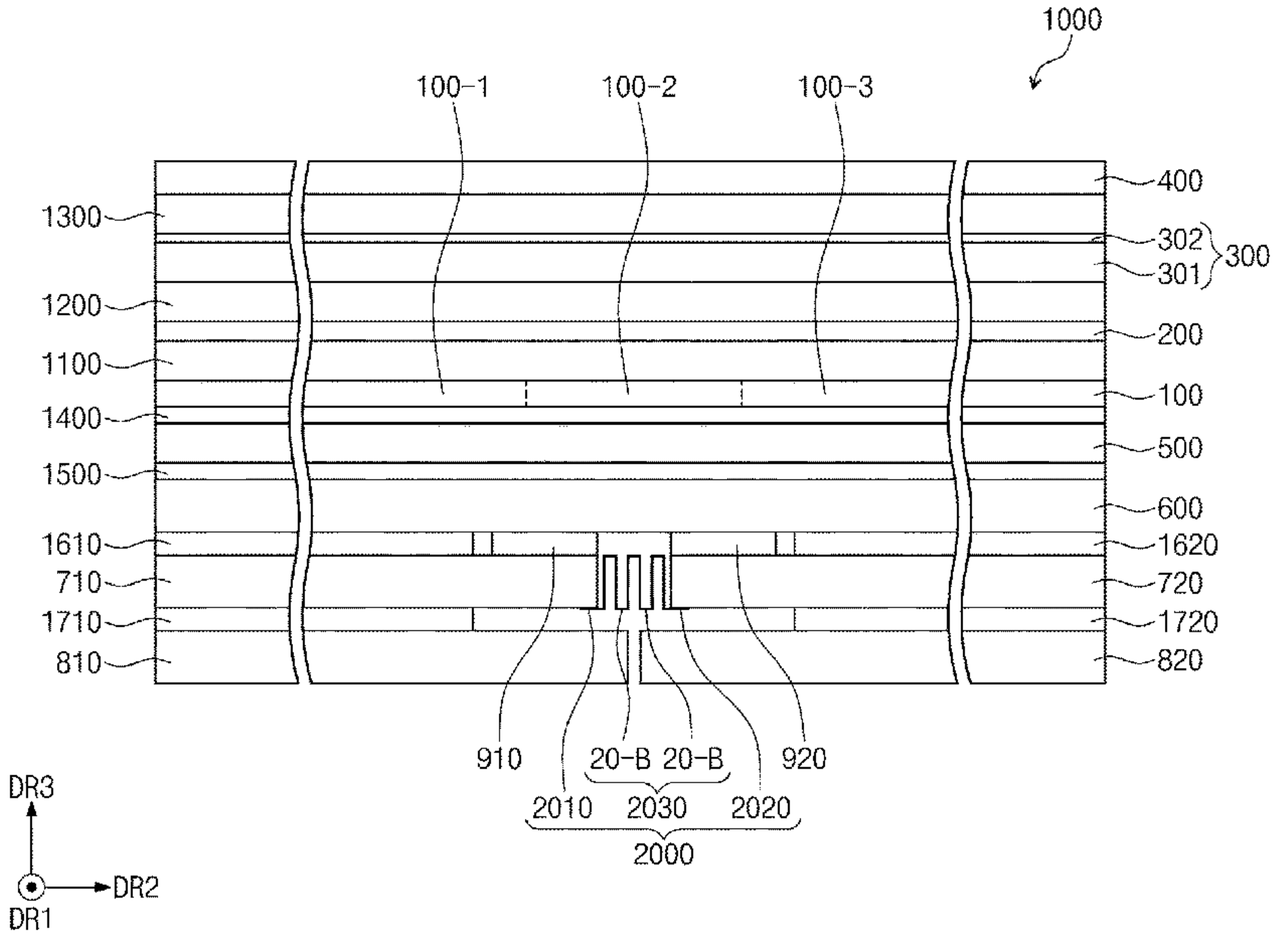

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FIG. 1A

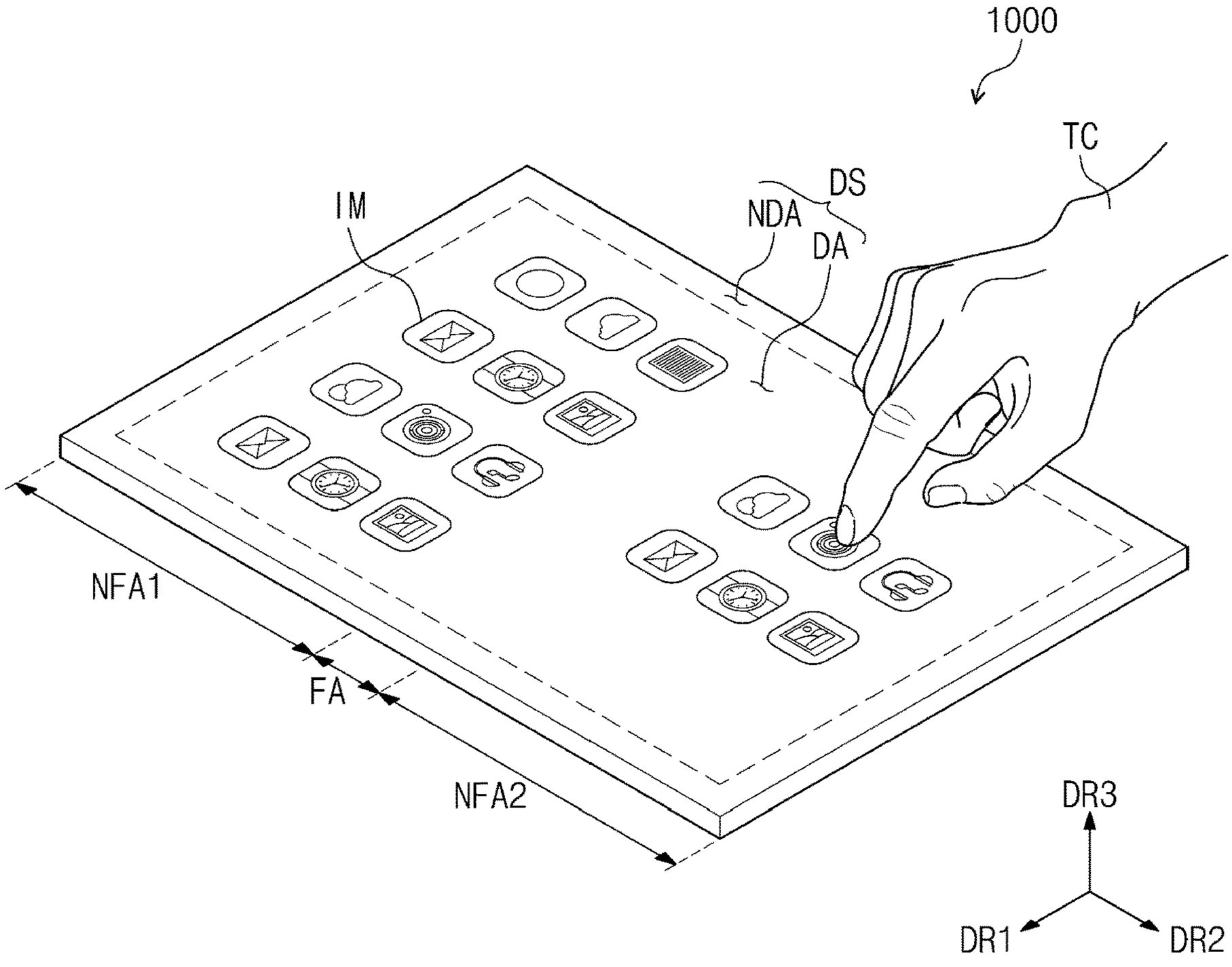

1000
TC
DS
NDA
DA
IM
NFA1
FA
NFA2
DR3
DR1
DR2

FIG. 1B

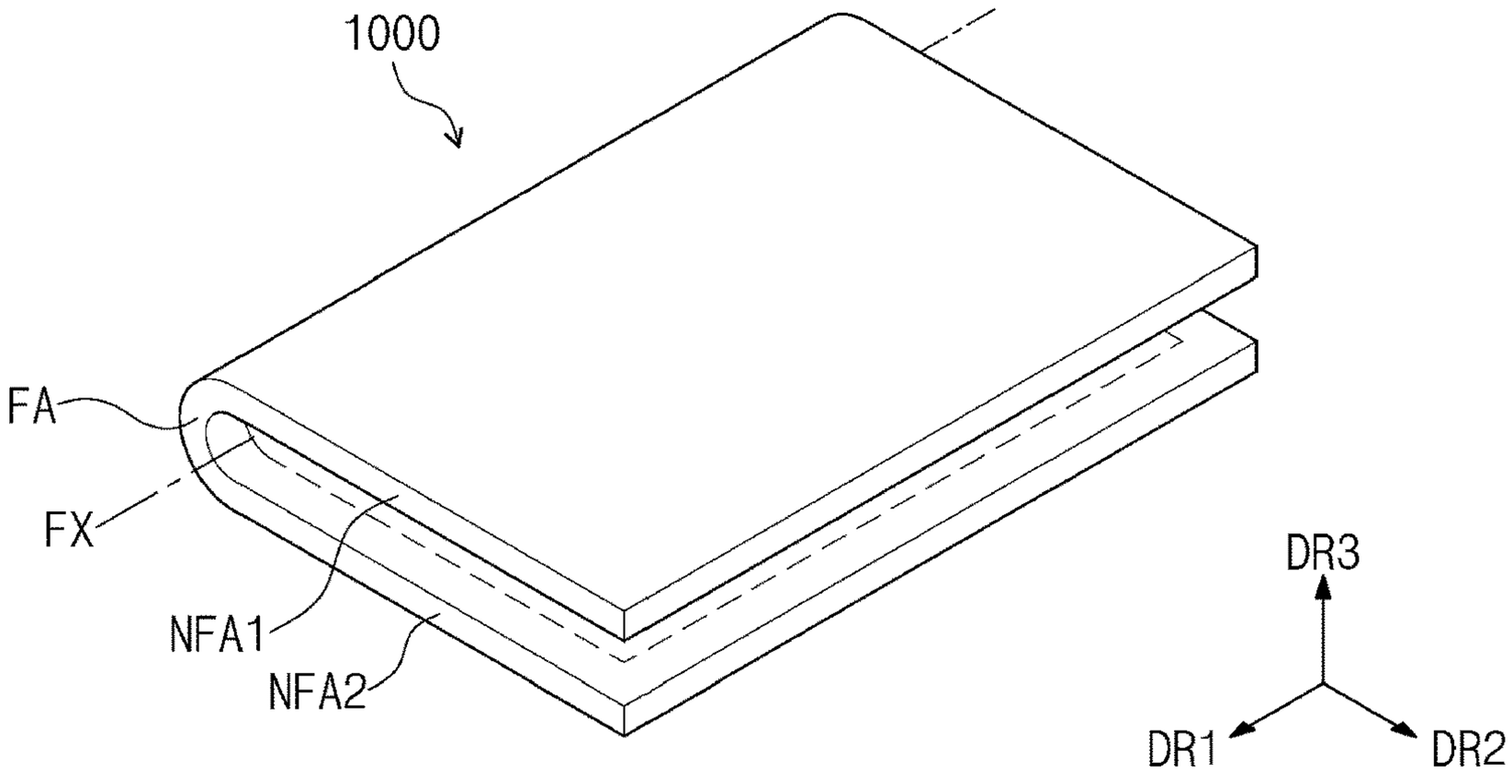

1000
FA
FX
NFA1
NFA2
DR3
DR1
DR2

FIG. 2A

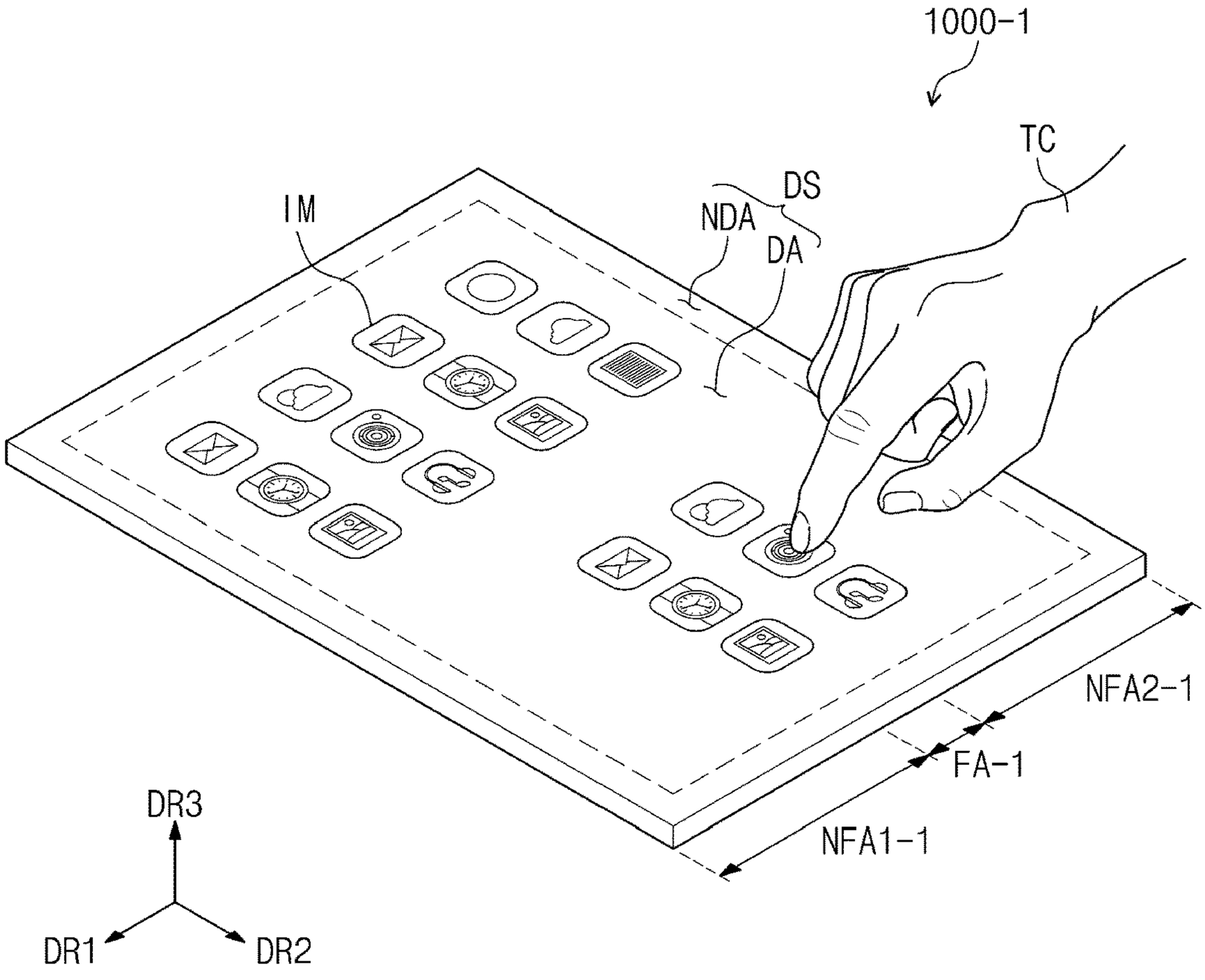

1000-1
TC
DS
NDA
DA
IM
NFA2-1
FA-1
NFA1-1
DR3
DR1
DR2

FIG. 2B

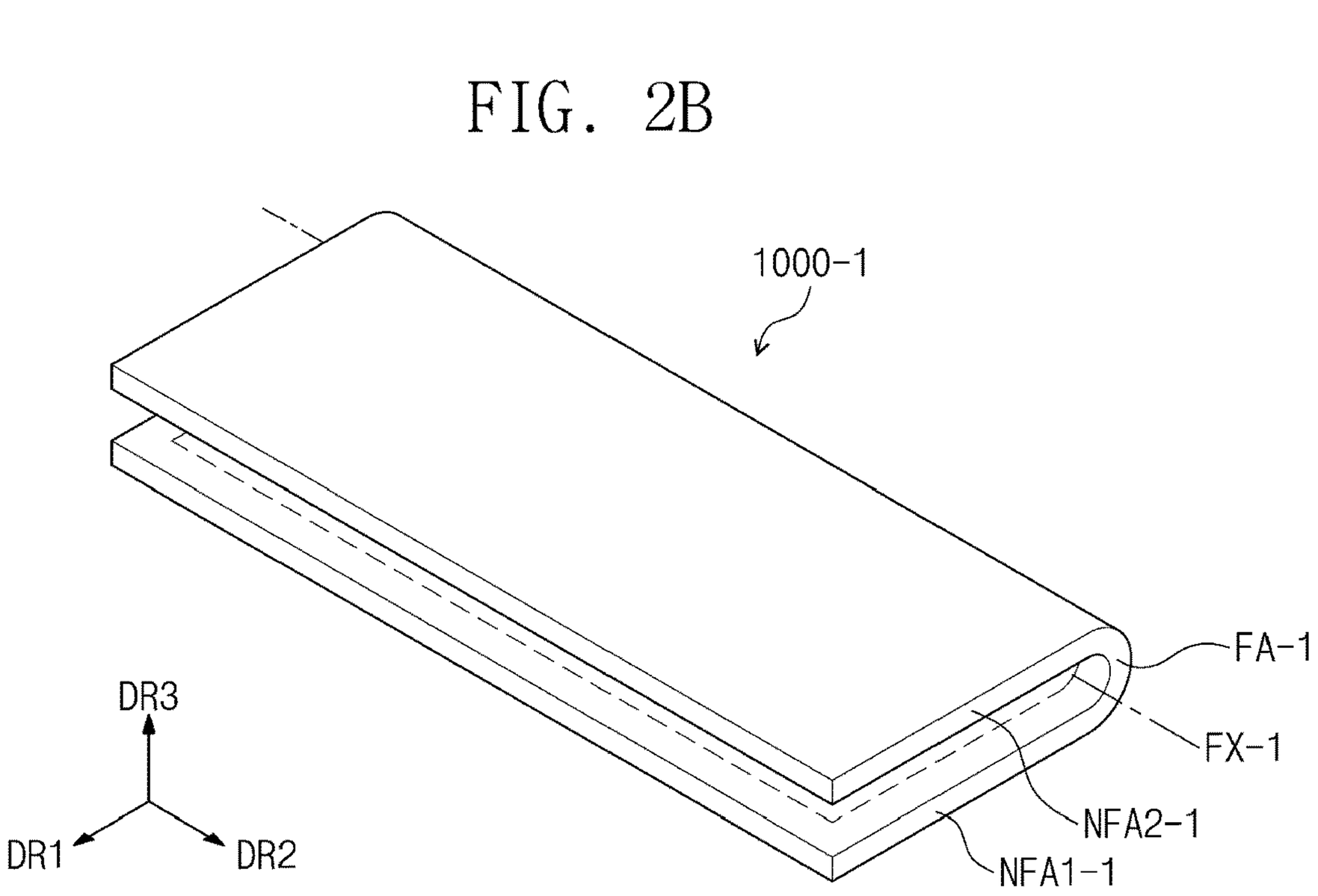
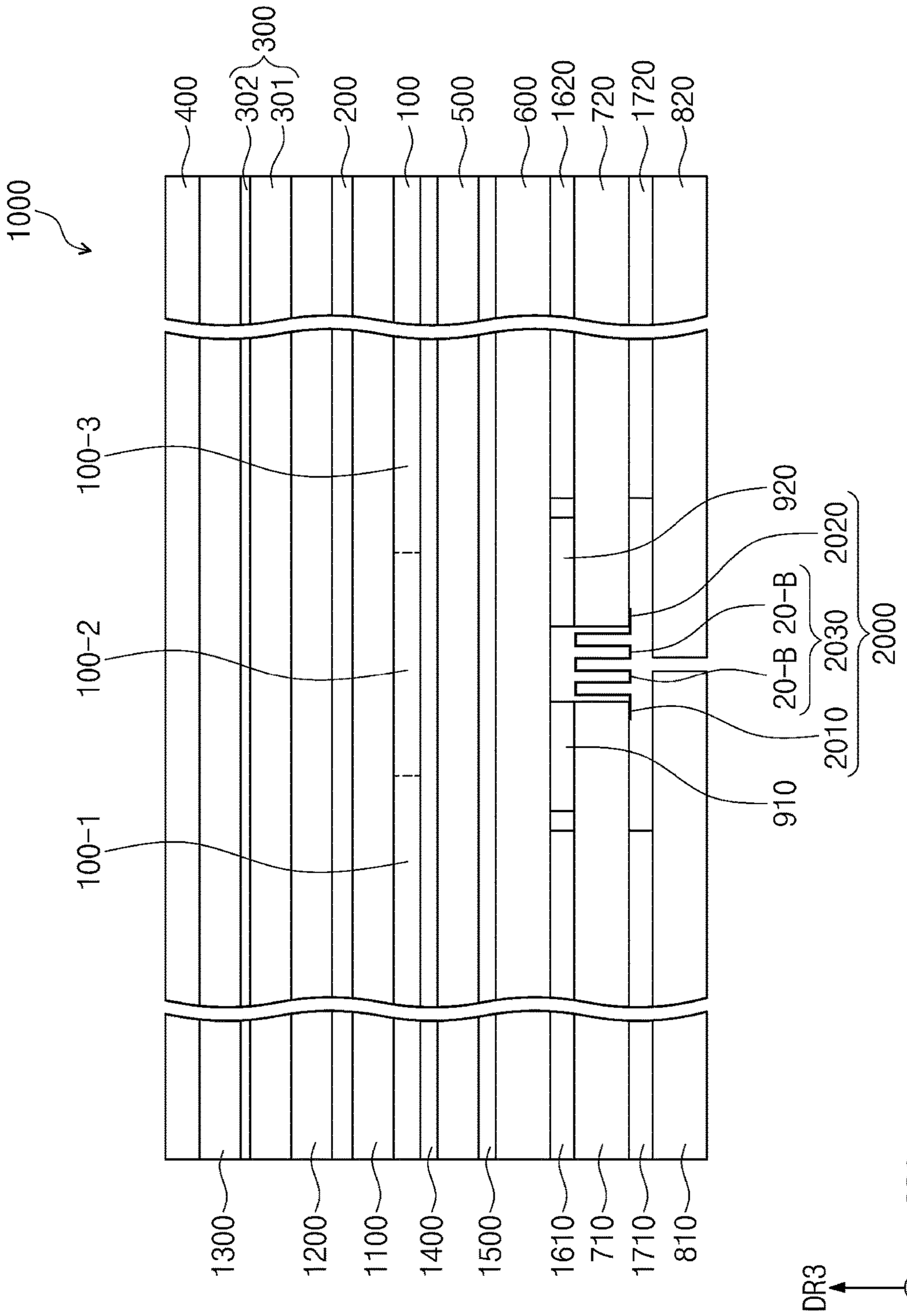

1000-1
FA-1
FX-1
NFA2-1
NFA1-1
DR3
DR1
DR2

FIG. 3


1000
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300
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301
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100
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600
1620
720
1720
820
100-3
100-2
100-1
920
2020
20-B
20-B
2030
2010
2000
910
1300
1200
1100
1400
1500
1610
710
1710
810
DR3
DR2
DR1

FIG. 4

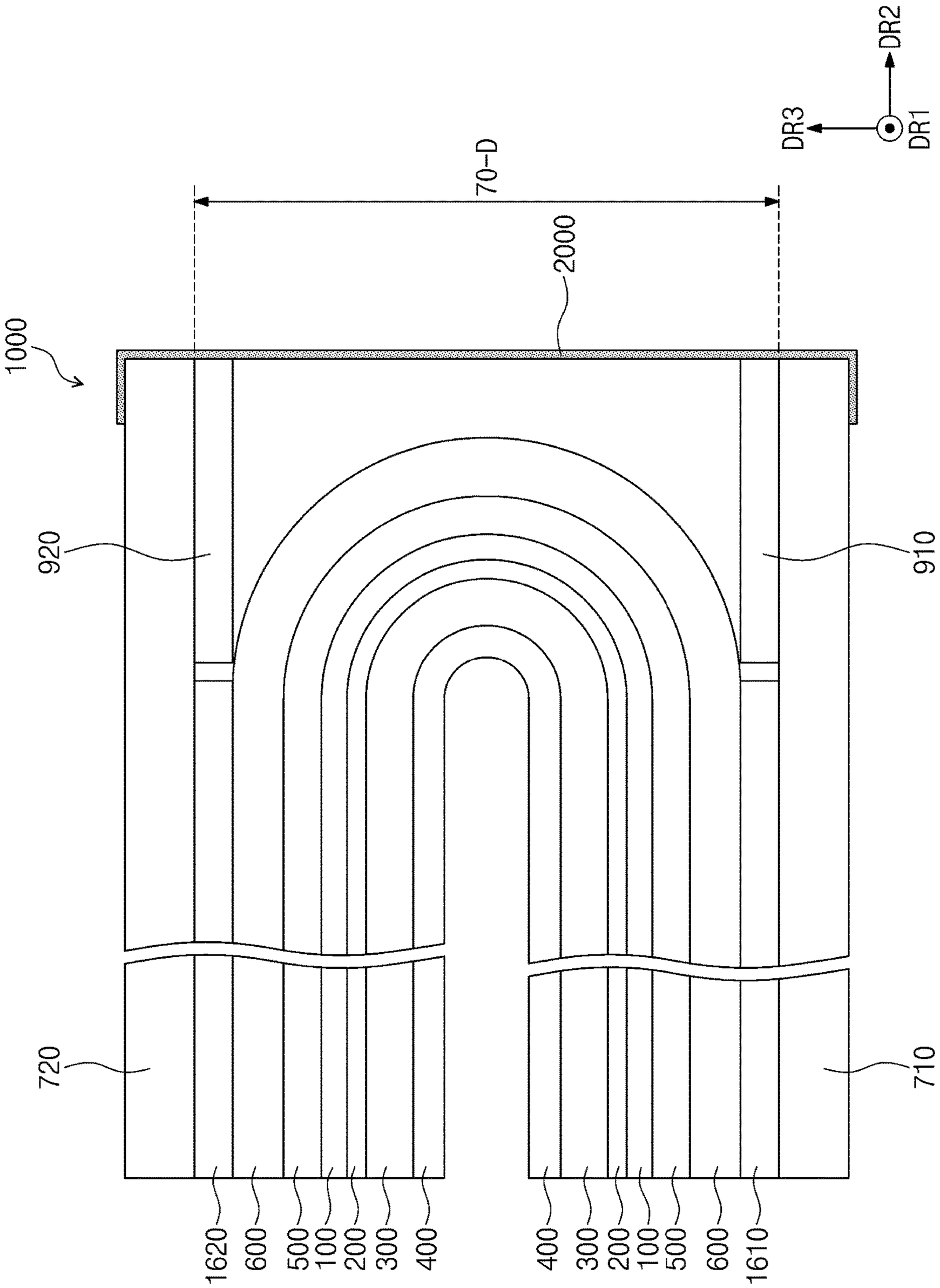

DR3
DR2
DR1
70-D
2000
1000
920
910
720
710
1620
600
500
100
200
300
400
400
300
200
100
500
600
1610

FIG. 5

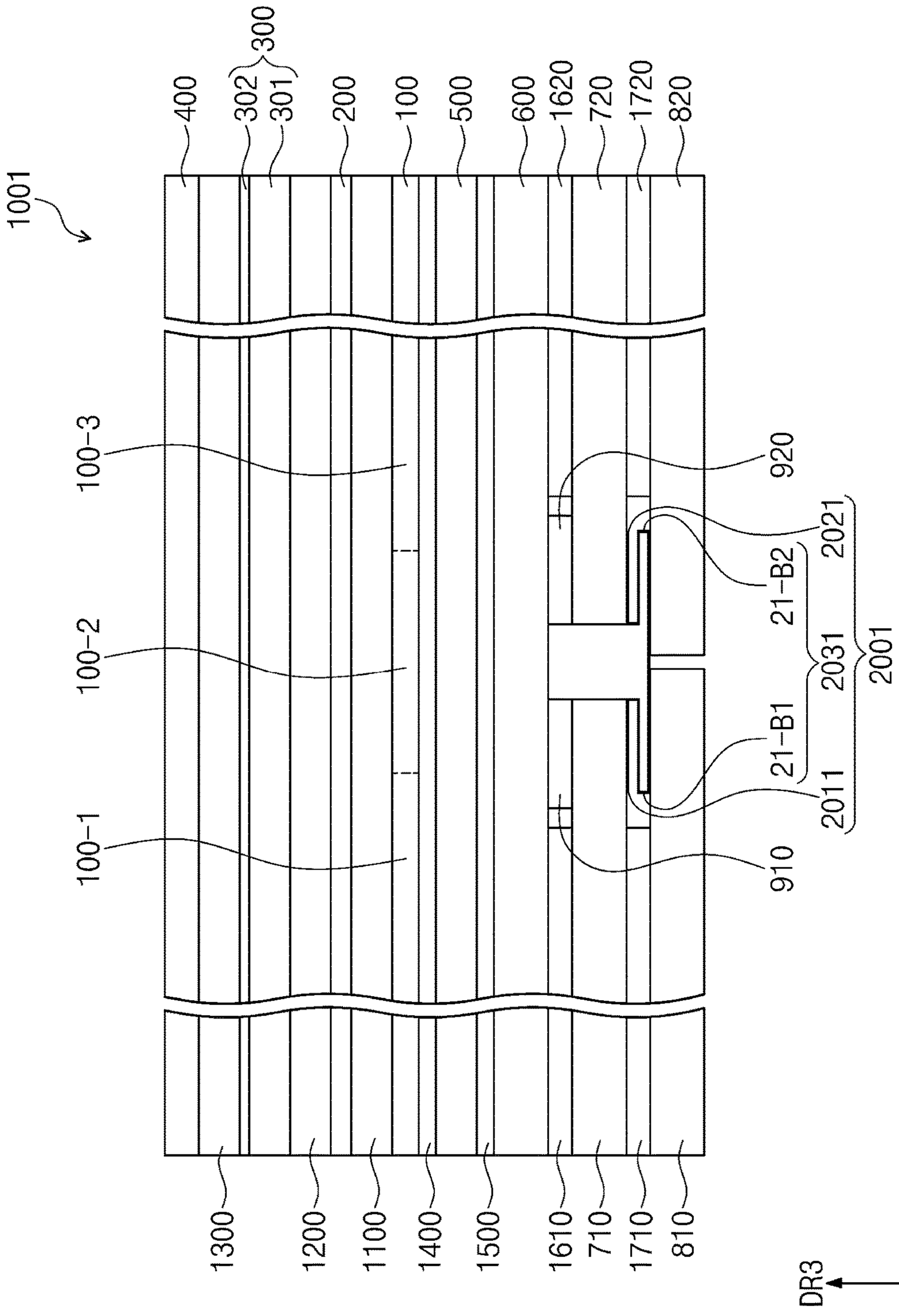

1001
400
300
302
301
200
100
500
600
1620
720
1720
820
100-3
100-2
100-1
920
21-B2
2021
2031
2001
21-B1
2011
910
1300
1200
1100
1400
1500
1610
710
1710
810
DR3
DR2
DR1

FIG. 6

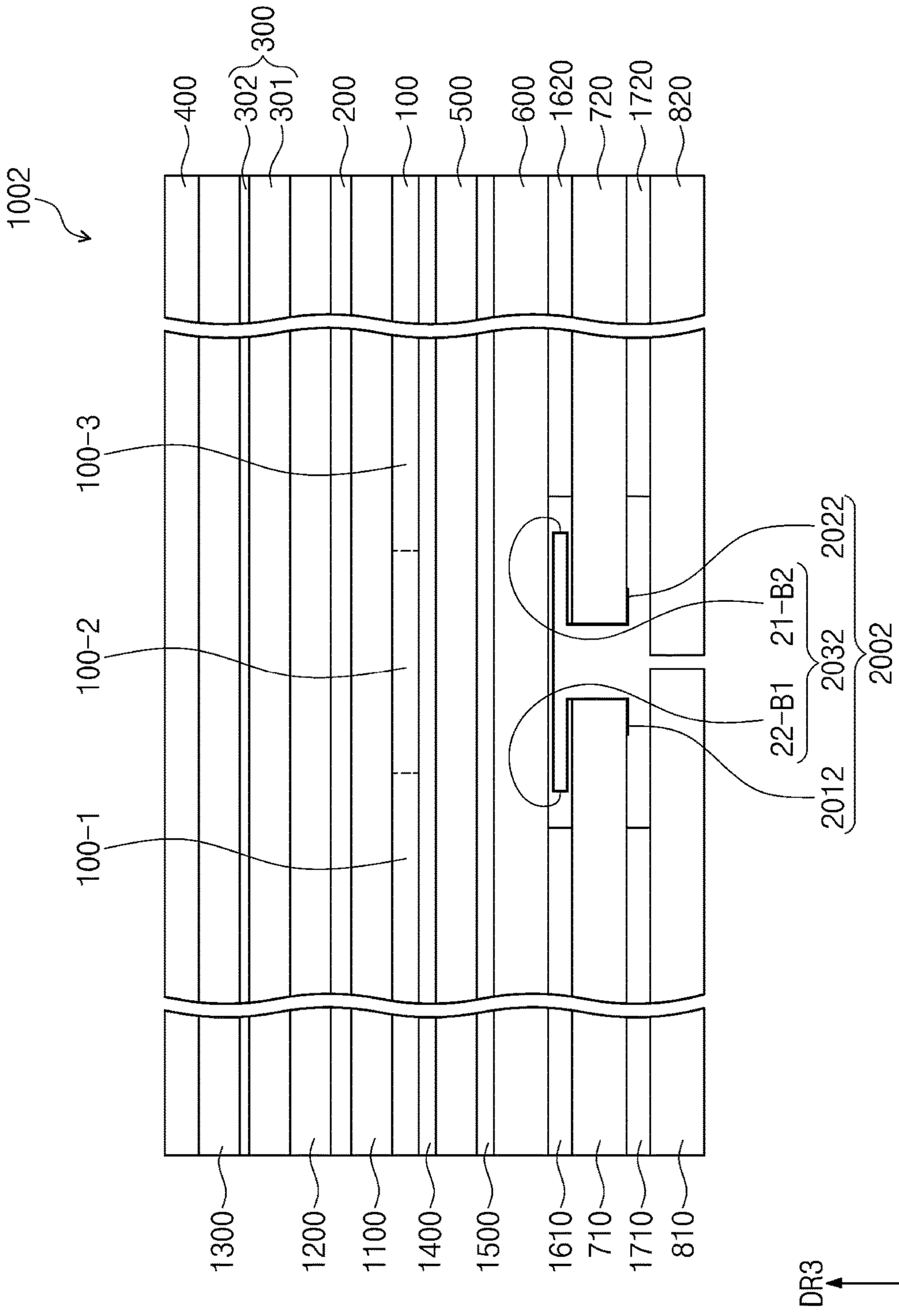

1002
400
300
302
301
200
100
500
600
1620
720
1720
820
100-3
100-2
100-1
2022
21-B2
2032
22-B1
2002
2012
1300
1200
1100
1400
1500
1610
710
1710
810
DR3
DR2
DR1

FIG. 7

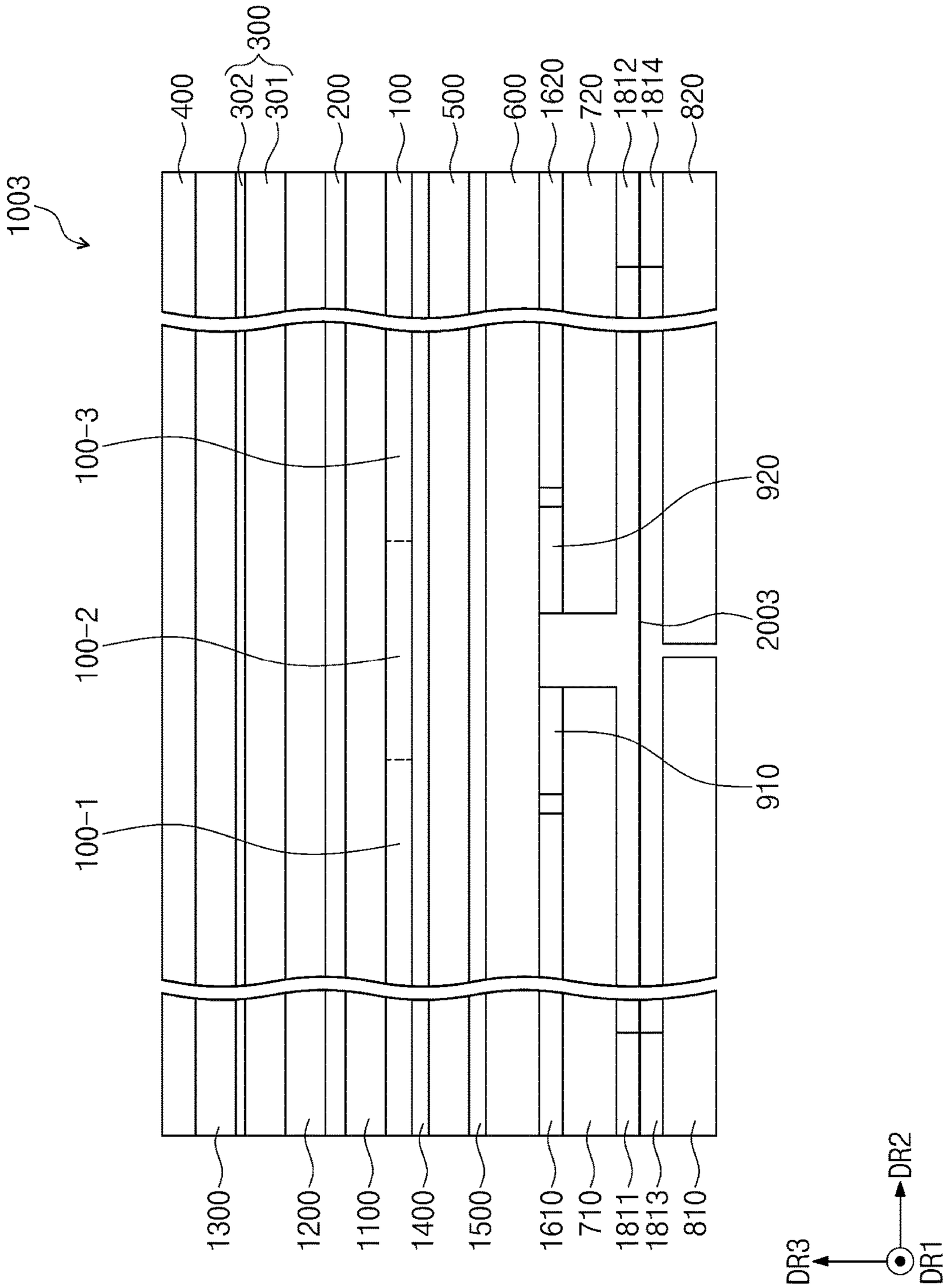

1003
400
302
300
301
200
100
500
600
1620
720
1812
1814
820
100-3
100-2
100-1
920
2003
910
1300
1200
1100
1400
1500
1610
710
1811
1813
810
DR3
DR2
DR1

FIG. 8

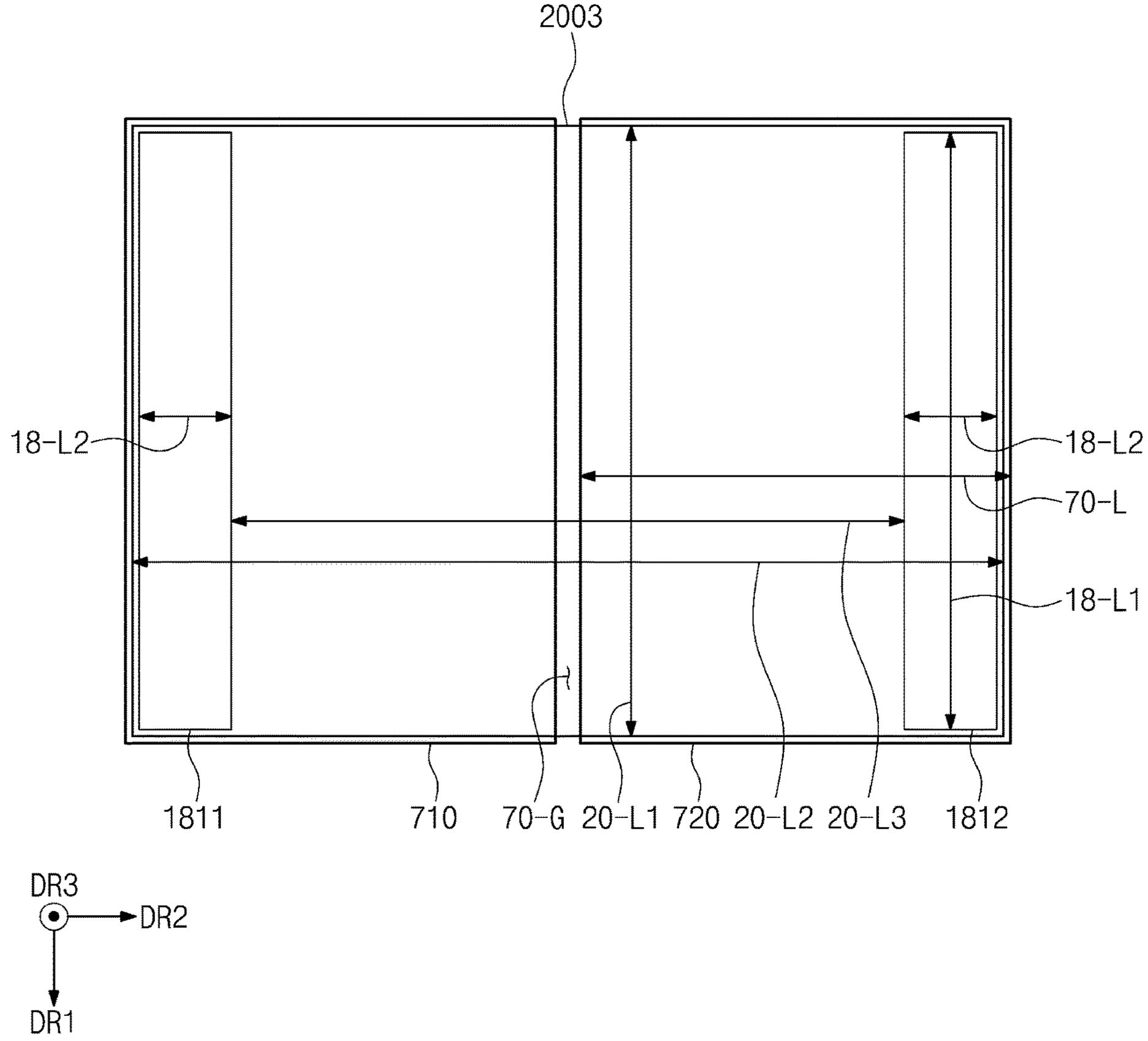
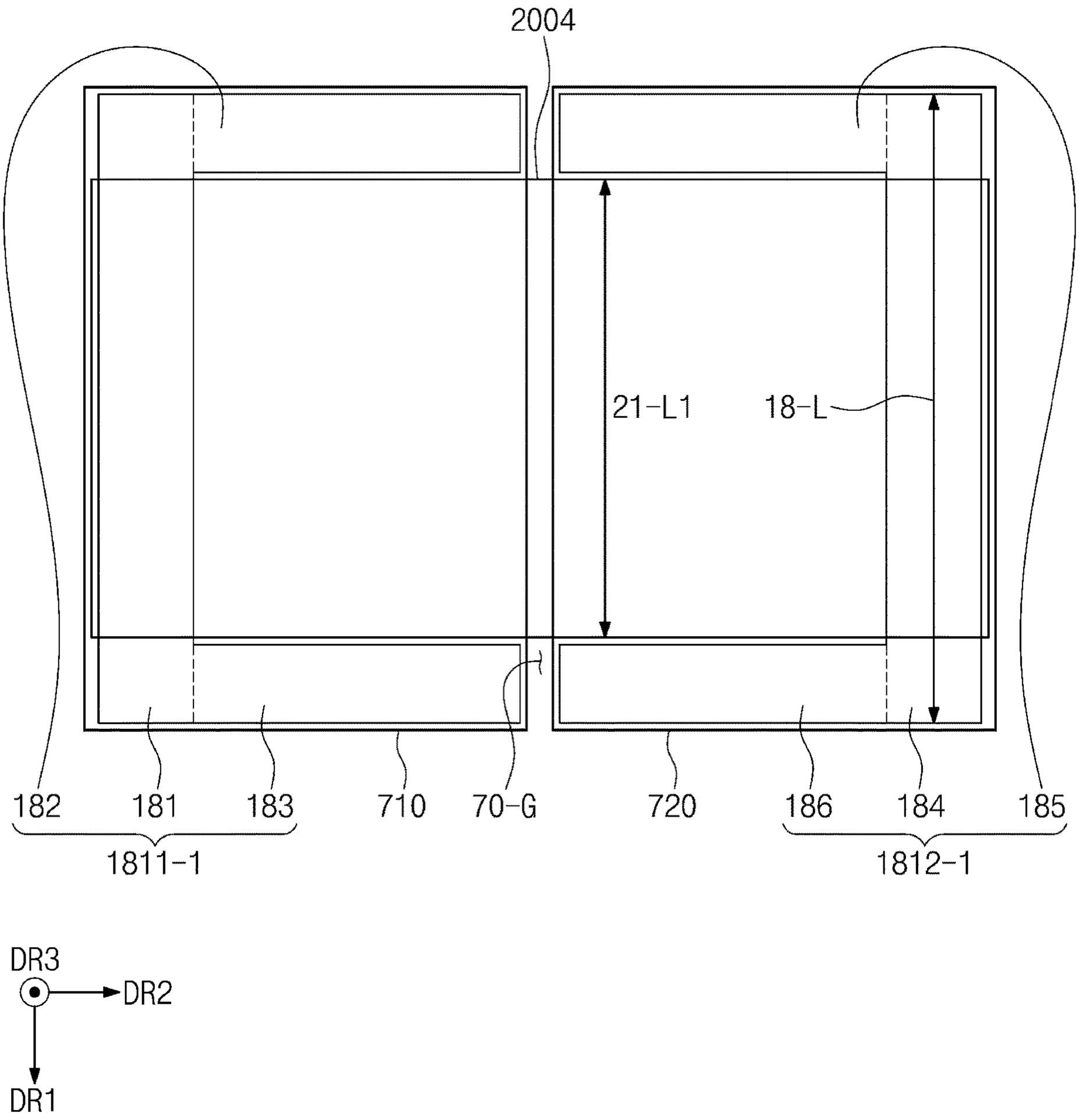

2003
18-L2
18-L2
70-L
18-L1
1811
710
70-G
20-L1
720
20-L2
20-L3
1812
DR3
DR2
DR1

FIG. 9


2004
21-L1
18-L
182
181
183
710
70-G
720
186
184
185
1811-1
1812-1
DR3
DR2
DR1

DISPLAY DEVICE

This application claims priority to Korean Patent Application No. 10-2019-0170829 filed on Dec. 19, 2019, and all the benefits accruing therefrom under 35 U.S.C. § 119, the disclosure of which is hereby incorporated by reference in its entirety.

BACKGROUND

(1) Field

The invention relates to a display device with increased product reliability.

(2) Description of the Related Art

Display devices display various images on a display screen to provide information to users. In general, a display device displays information within a display screen of a display panel. Flexible display devices have been developed to include flexible display panels capable of being folded.

SUMMARY

One or more embodiment provides a display device with increased product reliability.

According to an embodiment, a display device includes a display module including a first region, a second region and a third region arranged in order; a first plate corresponding to the first region of the display module; a second plate corresponding to the third region of the display module and spaced apart from the first plate at the second region of the display module; and a cover film attached to the first plate and the second plate.

In an embodiment, the cover film may include: a first attachment region attached to the first plate; a second attachment region attached to the second plate; and a connection region between the first attachment region and the second attachment region. The connection region may include a plurality of bent portions.

In an embodiment, the first attachment region may be attached to a bottom surface of the first plate. The second attachment region may be attached to a bottom surface of the second plate.

In an embodiment, the plurality of bent portions may be in a gap between the first plate and the second plate.

In an embodiment, the plurality of bent portions may include: a first bent portion between the first plate and the display module; and a second bent portion between the second plate and the display module.

In an embodiment, the plurality of bent portions may include: a first bent portion below the first plate; and a second bent portion below the second plate.

In an embodiment, the cover film may cover a portion of a side surface of the first plate and a portion of a side surface of the second plate.

In an embodiment, the display device may further include: a first adhesive layer between the cover film and the first plate; and a second adhesive layer between the cover film and the second plate.

In an embodiment, the first adhesive layer may have a bar shape which extends along a first direction. The second adhesive layer may have a bar shape which extends along the first direction.

In an embodiment, a length along the first direction of each of the first and second adhesive layers may be substantially the same as a width of the cover film along the first direction.

In an embodiment, the first adhesive layer may include: a first adhesive region which extends along a first direction; a second adhesive region which extends along a second direction from one end of the first adhesive region, the second direction intersecting the first direction; and a third adhesive region which extends along the second direction from another end of the first adhesive region. The second adhesive layer may include: a fourth adhesive region which extends along the first direction; a fifth adhesive region which extends along the second direction from one end of the fourth adhesive region; and a sixth adhesive region which extends along the second direction from another end of the fourth adhesive region. The second adhesive region, the third adhesive region, the fifth adhesive region and the sixth adhesive region may each be between the first adhesive region and the fourth adhesive region.

In an embodiment, a width along the first direction of the cover film, may be less than a distance between the second adhesive region and the third adhesive region.

In an embodiment, the first region and the third region may be unfolding areas. The second region may be a folding area.

In an embodiment, a partial region of the first plate may be below the second region. A partial region of the second plate may be below the second region.

In an embodiment, the display module which is unfolded may be flat; and the display module which is folded may dispose the first region and the third region facing each other. The first plate is movable together with folding or unfolding of the display module. The second plate is movable together with the folding or unfolding of the display module. The cover film is deformable together with the folding or unfolding of the display module.

In an embodiment, the cover film may be a flexible film.

In an embodiment, the display device may further include: a first intermediate adhesive layer between the display module and the first plate, the first intermediate adhesive layer overlapping the first region; a first step compensation film between the display module and the first plate, the first step compensation film overlapping the second region; a second intermediate adhesive layer between the display module and the second plate, the second intermediate adhesive layer overlapping the third region; and a second step compensation film between the display module and the second plate, the second step compensation film overlapping the second region.

According to an embodiment, a display device includes a display module which is foldable and unfoldable, the display module including: a folding area at which the display module is foldable, and a first non-folding area and a second non-folding area facing each other with the folding area therebetween; a first plate corresponding to the first non-folding area of the display module, the first plate movable together with the display module; a second plate corresponding to the second non-folding area of the display module and spaced apart from the first plate at the folding area, the second plate movable together with the display module; and a cover film deformable together with the display module and connected between the first plate and the second plate. The first plate and the second plate which are spaced apart from each other, define a gap space therebetween, at the folding area, and the cover film covers the gap space which is between the first plate and the second plate.

In an embodiment, the cover film may include: a first attachment region attached to the first plate; a second attachment region attached to the second plate; and a connection region between the first attachment region and the second attachment region, the connection region including a plurality of bent portions.

In an embodiment, the display device may further include: a first adhesive layer between the cover film and the first plate, the first adhesive layer extending along a first direction; and a second adhesive layer between the cover film and the second plate, the second adhesive layer extending along the first direction. A length along the first direction of each of the first and second adhesive layers may be equal to or greater than a width along the first direction of the cover film.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other advantages and features of this disclosure will become more apparent by describing in further detail exemplary embodiments thereof with reference to the accompanying drawings, in which:

FIG. **1**A illustrates a perspective view showing an embodiment of a display device.

FIG. **1**B illustrates a perspective view showing the display device depicted in FIG. **1**A, which is folded.

FIG. **2**A illustrates a perspective view showing an embodiment of a display device.

FIG. **2**B illustrates a perspective view showing the display device depicted in FIG. **2**A, which is folded.

FIG. **3** illustrates a cross-sectional view showing an embodiment of a display device, which is unfolded.

FIG. **4** illustrates a cross-sectional view showing an embodiment of a display device which is folded.

FIG. **5** illustrates a cross-sectional view showing an embodiment of a display device.

FIG. **6** illustrates a cross-sectional view showing an embodiment of a display device.

FIG. **7** illustrates a cross-sectional view showing an embodiment of a display device.

FIG. **8** illustrates a top plan view showing an embodiment of a display device.

FIG. **9** illustrates a top plan view showing an embodiment of a display device.

DETAILED DESCRIPTION

The invention now will be described more fully hereinafter with reference to the accompanying drawings, in which various embodiments are shown. This invention may, however, be embodied in many different forms, and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art.

In this description, when a component (or region, layer, portion, etc.) is referred to as being related to another component such as being "on," "connected to" or "coupled to" other component(s), the component may be directly disposed on, directly connected to, or directly coupled to the other component(s) or at least one intervening component may be present therebetween. In contrast, when a component (or region, layer, portion, etc.) is referred to as being related to another component such as being "directly on," "directly connected to" or "directly coupled to" other component(s), no intervening component is present therebetween.

Like numerals indicate like components. Moreover, in the drawings, thicknesses, ratios, and dimensions of components are exaggerated for effectively explaining the technical contents.

The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting. As used herein, "a", "an," "the," and "at least one" do not denote a limitation of quantity, and are intended to include both the singular and plural, unless the context clearly indicates otherwise. For example, "an element" has the same meaning as "at least one element," unless the context clearly indicates otherwise. "At least one" is not to be construed as limiting "a" or "an." "Or" means "and/or." The term "and/or" includes one or more combinations defined by associated components.

It will be understood that, although the terms first, second, etc. may be used herein to describe various components, these components should not be limited by these terms. These terms are only used to distinguish one component from another component. For example, a first component could be termed a second component, and vice versa without departing from the scope of the invention. Unless the context clearly indicates otherwise, the singular forms are intended to include the plural forms as well.

In addition, the terms "beneath," "lower," "above," "upper" and the like are used herein to describe one component's relationship to other component(s) illustrated in the drawings. The relative terms are intended to encompass different orientations in addition to the orientation depicted in the drawings.

"About" or "approximately" as used herein is inclusive of the stated value and means within an acceptable range of deviation for the particular value as determined by one of ordinary skill in the art, considering the measurement in question and the error associated with measurement of the particular quantity (i.e., the limitations of the measurement system). For example, "about" can mean within one or more standard deviations, or within ±30%, 20%, 10% or 5% of the stated value.

Unless otherwise defined, all terms used herein including technical and scientific terms have the same meaning generally understood by one of ordinary skilled in the art. Also, terms as defined in dictionaries generally used should be understood as having meaning identical or meaning contextually defined in the art and should not be understood as ideally or excessively formal meaning unless definitely defined herein.

It should be understood that the terms "comprise," "include," "have" and the like are used to specify the presence of stated features, integers, steps, operations, components, elements, or combinations thereof, but do not preclude the presence or addition of one or more other features, integers, steps, operations, components, elements, or combinations thereof.

Exemplary embodiments are described herein with reference to cross section illustrations that are schematic illustrations of idealized embodiments. As such, variations from the shapes of the illustrations as a result, for example, of manufacturing techniques and/or tolerances, are to be expected. Thus, embodiments described herein should not be construed as limited to the particular shapes of regions as illustrated herein but are to include deviations in shapes that result, for example, from manufacturing. For example, a region illustrated or described as flat may, typically, have rough and/or nonlinear features. Moreover, sharp angles that are illustrated may be rounded. Thus, the regions illustrated in the figures are schematic in nature and their shapes are not

intended to illustrate the precise shape of a region and are not intended to limit the scope of the present claims.

Unlike rigid display devices, flexible display devices are foldable, rollable or bendable. A flexible display device is deformable into various shapes regardless of a size of the display screen, to thereby improve user convenience in transporting or using the flexible display device.

The following will now describe embodiments of the invention in conjunction with the accompanying drawings.

FIG. **1**A illustrates a perspective view showing an embodiment of a display device **1000** which is flat or unfolded. FIG. **1**B illustrates a perspective view showing the display device **1000** depicted in FIG. **1**A, which is bent or folded.

Referring to FIGS. **1**A and **1**B, a display device **1000** may be a foldable display device. One or more embodiment of the display device **1000** may be applicable not only to relatively large-sized electronic products such as television sets and display monitors, but also to relatively small and medium-sized electronic products such as mobile phones, tablet personal computers ("PCs"), automotive navigation systems, game consoles and smart watches.

A top surface of the display device **1000** may be a display surface DS. The display surface DS in the display device **1000** which is unfolded may be disposed in or parallel to a plane defined by a first direction DR**1** and a second direction DR**2** which cross each other. A thickness direction of the display device **1000** may be defined along a third direction DR**3** which crosses each of the first direction DR**1** and the second direction DR**2**. Various components of the display device **1000** may be disposed in the plane and/or along the thickness direction described above for the display device **1000**.

The display surface DS may include a display area DA and a non-display area NDA which is adjacent to the display area DA, such as surrounding the display area DA in the top plan view. Various components of the display device **1000** may have a display area DA and a non-display are NDA corresponding to those described above for the display device **1000**. The display area DA may be a region where one or more of an image IM is displayed, and the non-display area NDA may be a region where the image IM is not displayed. FIG. **1**A shows application icons as an example of the image IM.

The display area DA may have a tetragonal shape. The non-display area NDA may surround the display area DA. The invention, however, is not limited thereto, and the display area DA and the non-display area NDA may be relatively changed in shape.

The display device **1000** may include a first non-folding area NFA**1**, a folding area FA and a second non-folding area NFA**2** that are sequentially defined along the second direction DR**2**. In an embodiment, for example, the folding area FA may be defined between the first non-folding area NFA**1** and the second non-folding area NFA**2**. Although FIGS. **1**A and **1**B show one of the folding area FA and two non-folding areas (e.g., first non-folding area NFA**1** and second non-folding area NFA**2**), limitations are imposed on neither the number of the folding area FA nor the number of the non-folding areas. In an embodiment, for example, the display device **1000** may include more than two non-folding areas and a plurality of folding areas which are disposed between the non-folding areas.

The display device **1000** may be flat at the non-folding areas, even when the display device **1000** is folded. The display device **1000** may be foldable about a folding axis FX. In an embodiment, for example, the folding area FA may be bendable about the folding axis FX. That is, the folding area FA is a planar area at which the display device **1000** is foldable. The folding axis FX may extend along the first direction DR**1**. The folding axis FX may be defined as a minor axis that is parallel to a short side of the display device **1000** having relatively short sides extended along the first direction DR**1**, and relatively long sides extended along the second direction DR**2**, without being limited thereto.

The display device **1000** which is folded disposes the first non-folding area NFA**1** and the second non-folding area NFA**2** facing each other. That is, the display device **1000** which is folded disposes portions of the display surface DS facing each other. Therefore, in the display device **1000** which is folded, the display surface DS may not face outside the display device **1000** and may not be exposed externally. This, however, is only an example, and the invention is not limited thereto. In an embodiment, the display device **1000** which is folded may dispose portions of the top surface at the first and second non-folding areas NFA**1** and NFA**2** to face in opposite directions (e.g., away from each other) to be face outside the display device **1000**. Therefore, the display device **1000** which is folded disposes portions of the display surfaces DS facing outside the display device **1000** to be exposed externally.

FIG. **2**A illustrates a perspective view showing a display device **1000-1**. FIG. **2**B illustrates a perspective view showing the display device **1000-1** depicted in FIG. **2**A, which is folded.

Referring to FIGS. **2**A and **2**B, a display device **1000-1** may include a first non-folding area NFA**1-1**, a folding area FA-**1** and a second non-folding area NFA**2-1** that are sequentially defined along the first direction DR**1**. The folding area FA-**1** may be defined between the first non-folding area NFA**1-1** and the second non-folding area NFA**2-1**.

The display device **1000-1** may be foldable about a folding axis FX-**1**. In an embodiment, for example, the folding area FA-**1** may be bendable about the folding axis FX-**1**. The folding axis FX-**1** may extend along the second direction DR**2**. The folding axis FX-**1** may be defined as a major axis parallel to a long side of the display device **1000-1**.

The following will discuss a configuration of the display device **1000** that is foldable about the minor axis, but such description may also be applicable to the display device **1000-1** that is foldable about the major axis.

FIG. **3** illustrates a cross-sectional view showing an embodiment of a display device **1000**.

Referring to FIG. **3**, the display device **1000** may include a display module **100**, an antireflective layer **200**, a window **300**, an upper protective film **400**, a lower protective film **500**, a cushion layer **600**, a plate layer including a first plate **710** and a second plate **720**, and a component layer including a first set section **810** (e.g., first component portion) and a second set section **820** (e.g., second component portion).

The display module **100** may generate and/or display an image IM (FIG. **1**A) and may detect an external input TC (FIG. **1**A). The external input TC may be a touch of an input tool, a proximity of an input tool to the display device **1000** or display module **100**, etc. The input tool may include a body of a user of the display device **1000**, light, heat, pen, pressure or various other types of input tools. In FIG. **1**A, the external input TC is illustrated as hand or finger of a user which is applied to the display surface DS, such as by a contact to the display surface DS. This, however, is only an example, and the external input TC may be provided in various types as discussed above. Depending on a structure of the display device **1000**, the display device **1000** may

detect the external input TC that is applied to a side surface or rear surface of the display device **1000**, different from the top surface discussed above, but the invention is not limited thereto.

The display module **100** may include a display panel which generates an image, and an input sensing layer which obtains coordinate information of the external input TC.

The display panel may be, but not particularly limited to, a light emissive display panel. In an embodiment, for example, the display panel may be an organic light emitting display panel or a quantum-dot light emitting display panel. An emission layer of the organic light emitting display panel may include an organic light emitting material. An emission layer of the quantum-dot light emitting display panel may include a quantum-dot or a quantum-rod.

The input sensing layer may be directly disposed on the display panel. In an embodiment of a method for manufacturing the display device **1000**, for example, the input sensing layer may be provided or formed directly on the display panel, in a successive process to a process of providing or forming the display panel. The input sensing layer may include a plurality of dielectric layers and a plurality of conductive layers. The plurality of conductive layers may constitute a sensing electrode that detects external inputs, a sensing line connected to the sensing electrode, and a sensing pad connected to the sensing line. The input sensing layer may detect external inputs in a mutual capacitance method and/or a self-capacitance method. The external input sensing method, however, is not limited to the example mentioned above.

The display module **100** may include a first region **100-1**, a second region **100-2** and a third region **100-3** arranged in order. The first region **100-1** may correspond to the first non-folding area NFA**1** of FIG. **1**A, the second region **100-2** may correspond to the folding area FA of FIG. **1**A, and the third region **100-3** may correspond to the second non-folding area NFA**2** of FIG. **1**A. In an embodiment, for example, the first and third regions **100-1** and **100-3** may be non-folding areas, and the second region **100-2** may be a folding area FA. A first boundary is defined between the first region **100-1** and the second region **100-2** and a second boundary is defined between the third region **100-3** and the second region **100-2**.

The antireflective layer **200** may be disposed above or on the display module **100**. The antireflective layer **200** may reduce a reflectance of external light that is incident from outside the display device **1000**. The antireflective layer **200** may include a retarder and a polarizer. The retarder may be of a film type or a liquid crystal coating type, and may include a λ/2 retarder or a λ/4 retarder. The polarizer may also be of a film type or a liquid crystal coating type. The film type may include a stretchable synthetic resin film, and the liquid crystal coating type may include arrayed liquid crystals. The retarder and the polarizer may further include a protective film.

Alternatively, the antireflective layer **200** may include color filters. An arrangement of the color filters may be determined in consideration of colors of light emitted from pixels included in the display panel. The antireflective layer **200** may further include a black matrix adjacent to the color filters.

Alternatively, the antireflective layer **200** may include a destructive interference structure. In an embodiment, for example, the destructive interference structure may include a first reflective layer and a second reflective layer that are disposed at different levels. A first reflected light and a second reflected light, which are respectively reflected from the first reflective layer and the second reflective layer, may interfere destructively each other, and thus a reflectance of external light may be reduced.

A third adhesive layer **1100** may be disposed between the display module **100** and the antireflective layer **200**. The display module **100** and the antireflective layer **200** may be coupled to each other through the third adhesive layer **1100**. In an embodiment, the third adhesive layer **1100** may be omitted. Adhesive layers explained within this disclosure may include adhesives or glues. In an embodiment, for example, each of the adhesive layers may be a pressure sensitive adhesive ("PSA"), an optical clear adhesive ("OCA") or an optical clear resin ("OCR").

The window **300** may be disposed above or on the antireflective layer **200**. The window **300** may include a base layer **301** and a functional layer which may be coated on the base layer to define a functional coating layer **302**. The base layer **301** may include a glass substrate and/or a synthetic resin film. In an embodiment, for example, the base layer **301** may include a polyimide film. The base layer **301** is not limited to a single layer. The base layer **301** may include two or more films that are coupled to each other such as through an adhesive member. The functional coating layer **302** may include one or more of an anti-fingerprint layer, an antireflective layer and a hard coating layer.

A fourth adhesive layer **1200** may be disposed between the window **300** and the antireflective layer **200**. Alternatively, the fourth adhesive layer **1200** may be omitted.

The upper protective film **400** may be disposed above or on the window **300**. The addition of the upper protective film **400** may cause the display device **1000** to have improved impact resistance. The upper protective film **400** may define a top surface or outer surface of the display device **1000**. The upper protective film **400** may be a polymer film or a tempered glass film.

A fifth adhesive layer **1300** may be disposed between the upper protective film **400** and the window **300**. Alternatively, the fifth adhesive layer **1300** may be omitted. In an embodiment, the upper protective film **400** may be omitted.

The lower protective film **500** may be disposed below the display module **100**. The lower protective film **500** may be a layer that protects a bottom surface of the display module **100**. The lower protective film **500** may include a synthetic resin film, for example, a polyimide film or a polyethylene terephthalate film. This, however, is only an example, and the material of the lower protective film **500** is not limited to the mentioned above. A sixth adhesive layer **1400** may be disposed between the lower protective film **500** and the display module **100**.

The cushion layer **600** may be disposed below the lower protective film **500**. The cushion layer **600** may include sponge, foam or urethane resin. A seventh adhesive layer **1500** may be disposed between the lower protective film **500** and the cushion layer **600**.

The first and second plates **710** and **720** may be disposed below the cushion layer **600**. The first plate **710** may be placed below the first region **100-1** of the display module **100**, and the second plate **720** may be placed below the third region **100-3** of the display module **100**. A partial region of each of the first and second plates **710** and **720** may be placed below the second region **100-2**. The first and second plates **710** and **720** may be spaced apart from each other at the second region **100-2** by an interval. In the display device **1000** which is flat or unfolded, the first and second plates **710** and **720** may form a gap space (e.g., first gap) therebetween. That is, the first and second plates **710** and **720** are disconnected from each other at the second region **100-2**

corresponding to the folding area FA. Here, the first and second plates **710** and **720** may include side surfaces facing each other across the gap space, at the second region **100-2**.

Each of the first and second plates **710** and **720** may be a metal plate. In an embodiment, for example, each of the first and second plates **710** and **720** may include a stainless steel, aluminum or an alloy thereof. The first and second plates **710** and **720** may have a strength (e.g., mechanical strength) greater than that of the display module **100**.

A first intermediate adhesive layer **1610** may be disposed between the cushion layer **600** and the first plate **710**. That is the cushion layer **600** and the first plate **710** may face each other with the first intermediate adhesive layer **1610** therebetween. A second intermediate adhesive layer **1620** may be disposed between the cushion layer **600** and the second plate **720**. That is the cushion layer **600** and the second plate **720** may face each other with the second intermediate adhesive layer **1620** therebetween.

Each of the first and second intermediate adhesive layers **1610** and **1620** may define a top surface furthest from the plate layer and a bottom surface closest to the plate layer. The top surface and the bottom surface may be opposite to each other. Each of opposite surfaces of the first and second intermediate adhesive layers **1610** and **1620** may have adhesiveness. The first and second intermediate adhesive layers **1610** and **1620** may be spaced apart from each other at the second region **100-2** by an interval, and include side surfaces facing each other across the interval at the second region **100-2**.

In the third direction DR**3** parallel to a thickness direction of the display device **1000**, the first intermediate adhesive layer **1610** may overlap the first region **100-1**, and the second intermediate adhesive layer **1620** may overlap the third region **100-3**. In addition, neither the first intermediate adhesive layer **1610** nor the second intermediate adhesive layer **1620** may overlap the second region **100-2**. That is, the facing side surfaces of the first and second intermediate adhesive layers **1610** and **1620** may be spaced apart from the first boundary and the second boundary described above.

A portion of the cushion layer **600** which corresponds to the folding are FA is spaced apart from both the first plate **710** and the second plate **720**, to form a gap space (e.g., second gap) therebetween. The second gap may be connected with the first gap described above, to form a single gap by which the portion of the cushion layer **600** is exposed to outside the plate layer.

A first step compensation film **910** may be disposed between the cushion layer **600** and the first plate **710**. A second step compensation film **920** may be disposed between the cushion layer **600** and the second plate **720**. A step compensation layer includes the first and second step compensation films **910** and **920**. Each of the first and second step compensation films **910** and **920** may define a top surface furthest from the plate layer and a bottom surface closest to the plate layer. Each of the first and second step compensation films **910** and **920** may have one surface among the top and bottom surfaces, whose adhesiveness is less than that of the other surface among the top and bottom surfaces. In an embodiment, for example, the one surface may have no adhesiveness to be non-adhesive.

At the second region **100-2**, the first step compensation film **910** may be adjacent to the first intermediate adhesive layer **1610**, and the second step compensation film **920** may be adjacent to the second intermediate adhesive layer **1620**. The first intermediate adhesive layer **1610**, the first step compensation film **910**, the second intermediate adhesive layer **1620** and the second step compensation film **920** are in order, in a direction along the display module **100**. Therefore, the first intermediate adhesive layer **1610**, the first step compensation film **910**, the second step compensation film **920** and the second intermediate adhesive layer **1620** may be sequentially arranged along the second direction DR**2**. The first intermediate adhesive layer **1610**, the first step compensation film **910**, the second step compensation film **920** and the second intermediate adhesive layer **1620** which are sequentially arranged, are in a same layer of the display device **1000**.

In a plan view (e.g., in the third direction DR**3** parallel to a thickness direction of the display device **1000**), the first and second step compensation films **910** and **920** may each overlap the second region **100-2**. That is, the first step compensation film **910** in the first region **100-1** extends from the first region **100-2** and into the second region **100-2**, while the second compensation film **920** in the third region **100-3** extends from the third region **100-3** and into the second region **100-2**.

In the display module **100** which is unfolded, the first and second step compensation films **910** and **920** may support the second region **100-2** of the display module **100**. In the display module **100** which is folded, the first and second step compensation films **910** and **920** may be spaced apart from the cushion layer **600**.

A cover film **2000** may be attached to the first and second plates **710** and **720**. The cover film **2000** may cover at least a portion of a gap space between the first and second plates **710** and **720**. That is, the display device **1000** which is unfolded or folded, disposes the cover film **2000** covering a portion of the gap space between the first and second plates **710** and **720**.

The cover film **2000** may include a first attachment region **2010** at a first end of the cover film **2000**, a second attachment region **2020** at a second end of the cover film **2000** which is opposite to the first end, and a connection region **2030** connecting the first attachment region **2010** to the second attachment region **2020**. The first attachment region **2010** may be attached to the first plate **710** at a first side surface thereof, and the second attachment region **2020** may be attached to the second plate **720** at a second side surface thereof, where the first and second side surfaces face each other across the gap space. In an embodiment, for example, the first attachment region **2010** may be attached to a bottom surface of the first plate **710**, and the second attachment region **2020** may be attached to a bottom surface of the second plate **720**. The first attachment region **2010** may be a planar area of the cover film **2000** at which the cover film **2000** is attached to the bottom surface of the first plate **710**, and the second attachment region **2020** may be a planar area of the cover film **2000** at which the cover film **2000** is attached to a bottom surface of the second plate **720**.

The connection region **2030** may be disposed connected between the first attachment region **2010** and the second attachment region **2020**. The connection region **2030** may connect the first and second attachment regions **2010** and **2020** to each other, and may include a bending portion **20**B (e.g., bent portion) provided in plurality along the gap space (e.g., a plurality of bending portions **20**-B or bent portions). In an embodiment, for example, the connection region **2030** may be provided to include more than one fold or bend. The plurality of bending portions **20**-B may be disposed between the first and second plates **710** and **720**, particularly, between the facing side surfaces of the plate layer. The display device **1000** which is flat or unfolded may define an initial shape of the connection region **2030** including the plurality of bending portions **20**-B. The display device **1000** which is bent of

folded may change a shape of the connection region **2030** from the initial shape thereof.

The first plate **710** may correspond to the first set section **810**, and the second plate **720** may correspond to the second set section **820**. Each of the first and second set sections **810** and **820** within the component layer may include a functional component or a structural component of the display device **1000**, such as a camera module, a mainboard, a battery or a housing. The first and second set sections **810** and **820** may form base layer of the display device **1000**, without being limited thereto. The component layer including the first and second set sections **810** and **820** may form an outer surface (e.g., bottom surface) of the display device **1000**, without being limited thereto.

A first adhesive layer **1710** may be adhered to the bottom surface of the first plate **710**, and a second adhesive layer **1720** may be adhered to the bottom surface of the second plate **720**. The first adhesive layer **1710** may couple the first plate **710** to the first set section **810**, and the second adhesive layer **1720** may couple the second plate **720** to the second set section **820**.

FIG. **4** illustrates a cross-sectional view showing an embodiment of an end portion of a display device **1000** which is folded.

FIG. **4** shows an embodiment of the display device **1000** of FIG. **3**. For convenience of illustrate, the adhesive layers **1100**, **1200**, **1300**, **1400** and **1500**, the first set section **810**, the second set section **820**, the first adhesive layer **1710** and the second adhesive layer **1720** that are illustrated in FIG. **3**, are omitted in FIG. **4**.

Element layers of the display device **1000** may be foldable, deformable and/or movable together with each other. Referring to FIG. **4**, the cushion layer **600** is foldable together with the display module **100**. The cover film **2000** is deformable (e.g., elongated, straightened, etc.) together with folding or unfolding of the display module **100**. The first plate **710** and the second plate **720** are movable together with the folding or unfolding of the display module **100**.

An interval between the first and second plates **710** and **720** may be changed based on the shape of the display device **1000** which is bent or folded. The display device **1000** which folded, defines a distance **70**-D between the first and second plates **710** and **720**, along a thickness direction of the display device **1000**. In an embodiment, for example, the first and second plates **710** and **720** may have therebetween a distance **70**-D that becomes maximum when the display device **1000** is folded.

The display device **1000** which is unfolded disposes the folding area FA uncovered from the first plate **710** and the second plate **720**. Referring back to FIG. **3**, for example, since the first and second plates **710** and **720** are spaced apart from each other and from the cushion layer **600**, a bottom surface of the cushion layer **600** may be exposed to outside the plate layer.

A shape of the cover film **2000** may be deformed in response to a variation in gap **70**-G between the first and second plates **710** and **720**. That is, the cover film **2000** is movable together with the first and second plates **710** and **720**, in folding of the display device **1000**. Referring to FIG. **4**, for example, the display device **1000** which is folded disposes the cover film **2000** covering a portion of a gap space between the first and second plates **710** and **720**. Therefore, entry of foreign substances into a second gap between the cushion layer **600** and the first step compensation film **910** and/or between the cushion layer **600** and the second step compensation film **920**, from outside the display device **1000**, is reduced or effectively prevented. As a result, the display device **1000** may have increased reliability.

The bottom surfaces of the plate layer may be furthest from the display module **100**. Referring to FIG. **3**, in the display device **1000** which is unfolded, the cover film **2000** extends from a bottom surface of the plate layer and into the gap space between the first and second plates **710** and **720**. Referring to FIG. **4**, in the display device **1000** which folded, the cover film **2000** is disposed outside of the space defined by the distance **70**-D.

The cover film **2000** may be a flexible film. In an embodiment, for example, the cover film **2000** may include one or more of acryl-based resin, methacryl-based resin, polyisoprene, vinyl-based resin, epoxy-based resin, urethane-based resin, cellulose-based resin, siloxane-based resin, polyimide-based resin, polyamide-based resin and perylene-based resin. The cover film **2000** may be, for example, a thermoplastic polyurethane film.

FIG. **5** illustrates a cross-sectional view showing an embodiment of a display device **1001**. In the embodiment of FIG. **5**, the same components as those shown in FIG. **3** are allocated the same reference symbols, and descriptions thereof will be omitted.

Referring to FIG. **5**, a display device **1001** may include a cover film **2001**. A same one of the cover film **2001** may be attached to the first plate **710** and the second plate **720**. The cover film **2001** may cover at least a portion of a gap space between the first and second plates **710** and **720**.

The cover film **2001** may include a first attachment region **2011**, a second attachment region **2021** and a connection region **2031**. The first attachment region **2011** may be attached to the bottom surface of the first plate **710**, and the second attachment region **2021** may be attached to the bottom surface of the second plate **720**.

The connection region **2031** may connect the first and second attachment regions **2011** and **2021** to each other, and may include a first bending portion **21**-B**1** provided in plurality (e.g., a plurality of first bending portions **21**-B**1**) and a second bending portion **21**-B**2** provided in plurality (e.g., a plurality of second bending portions **21**-B**2**). At least one of the first bending portion **21**-B**1** may be disposed between the first plate **710** and the first set section **810**. At least one of the second bending portion **21**-B**2** may be disposed between the second plate **720** and the second set section **820**.

Referring to FIG. **5**, in the display device **1001** which is unfolded, the cover film **2001** extends from a bottom surface of the plate layer and in a direction away from the gap space between the first and second plates **710** and **720**. Referring to FIG. **5** taken together with FIG. **4**, the display device **1001** which is unfolded and folded, disposes an entirety of the cover film **2001** outside of the gap space between the first and second plates **710** and **720**. The connection region **2031** covers the gap space between the first and second plates **710** and **720**.

A shape of the connection region **2031** may be changed in response to deformation in shape of the display device **1001**. The cover film **2001** may cover the bottom surface of the cushion layer **600** corresponding to the folding area FA. Therefore, entry of foreign substances into a gap between the cushion layer **600** and the first step compensation film **910** and/or between the cushion layer **600** and the second step compensation film **920**, is reduced or effectively prevented. As a result, the display device **1001** may have increased reliability.

FIG. **6** illustrates a cross-sectional view showing an embodiment of a display device **1002**. In the embodiment of

FIG. **6**, the same components as those shown in FIG. **3** are allocated the same reference symbols, and descriptions thereof will be omitted. Different from the display device **1000** of FIG. **3**, the display device **1002** of FIG. **6** excludes both the first step compensation film **910** and the second step compensation film **920**.

Referring to FIG. **6**, the display device **1002** may include a cover film **2002**. The cover film **2002** may be attached to the first plate **710** and the second plate **720**. The cover film **2002** may cover at least a portion of a gap space between the first and second plates **710** and **720**.

The cover film **2002** may include a first attachment region **2012**, a second attachment region **2022** and a connection region **2032**. The first attachment region **2012** may be attached to the bottom surface of the first plate **710**, and the second attachment region **2022** may be attached to the bottom surface of the second plate **720**.

The connection region **2032** may connect the first and second attachment regions **2012** and **2022** to each other, and may include a third bending portion **22**-B**1** provided in plurality (e.g., a plurality of third bending portions **22**-B**1**) and a fourth bending portion **22**-B**2** provided in plurality (e.g., a plurality of fourth bending portions **22**-B**2**). Referring to FIG. **6**, in the display device **1002** which is unfolded, the cover film **2002** extends from a bottom surface of the plate layer and into the first gap between the first and second plates **710** and **720**. The cover film **2002** which in the first gap extends into the second gap between the cushion layer **600** and each of the first and second plates **710** and **720**.

The connection region **2032** may partially cover a side surface of each of the first and second plates **710** and **720**. The third bending portion **22**-B**1** may be disposed between the first plate **710** and the cushion layer **600**. The fourth bending portion **22**-B**2** may be disposed between the second plate **720** and the cushion layer **600**. When the display module **100** is unfolded, the connection region **2032** of the cover film **2002** may support the second region **100**-**2** of the display module **100** instead of the first step compensation film **910** and the second step compensation film **920**.

A shape of the connection region **2032** may be changed in response to deformation in shape of the display device **1002**. The cover film **2002** may cover the bottom surface of the cushion layer **600** corresponding to the folding area FA. Therefore, entry of foreign substances into a second gap between the cushion layer **600** and the first plate **710** and/or between the cushion layer **600** and the second plate **720**, may be reduced or effectively prevented. As a result, the display device **1002** may have increased reliability.

FIG. **7** illustrates a cross-sectional view showing an embodiment of a display device **1003**. In the embodiment of FIG. **7**, the same components as those shown in FIG. **3** are allocated the same reference symbols, and descriptions thereof will be omitted.

Referring to FIG. **7**, a display device **1003** may include a cover film **2003**. The cover film **2003** may be attached to the first plate **710** and the second plate **720**. The cover film **2003** may cover at least a portion of a gap space between the first and second plates **710** and **720**. In a direction along the display module **100** (e.g., second direction DR**2** in FIG. **7**), the display device **1003** which is unfolded disposes the cover film **2003** extending further than each of the first gap and the second gap.

An eighth adhesive layer **1811** may be disposed between the cover film **2003** and the first plate **710**, and a ninth adhesive layer **1812** may be disposed between the cover film **2003** and the second plate **720**. A tenth adhesive layer **1813** may be disposed between the cover film **2003** and the first set section **810**, and an eleventh adhesive layer **1814** may be disposed between the cover film **2003** and the second set section **820**.

The cover film **2003** may be a flexible film, and may include an elastic material. In an embodiment, for example, the cover film **2003** may include one or more of acryl-based resin, methacryl-based resin, polyisoprene, vinyl-based resin, epoxy-based resin, urethane-based resin, cellulose-based resin, siloxane-based resin, polyimide-based resin, polyamide-based resin and perylene-based resin. The cover film **2003** may be, for example, a thermoplastic polyurethane film.

The cover film **2003** may have a portion to which none of the eighth, ninth, tenth and eleventh adhesive layers **1811**, **1812**, **1813** and **1814** is attached. The portion of the cover film **2003** may have a length that is changeable in response to deformation in shape of the display device **1003**. That is, the display device **1003** which is unfolded disposes the cover film **2003** having a first length, and the display device **1003** which is folded disposes the cover film **2003** having a second length different from the first length.

FIG. **8** illustrates a top plan view showing an embodiment of a display device **1003** which is unfolded. FIG. **8** selectively shows the first plate **710**, the second plate **720**, the cover film **2003**, the eighth adhesive layer **1811**, and the ninth adhesive layer **1812**. A folding axis FX of the display device **1003** is extended along the first direction DR**1**.

Referring to FIG. **8**, each of the eighth and ninth adhesive layers **1811** and **1812** may have a bar shape that has a major dimension (e.g., length) along the first direction DR**1** and a minor dimension (e.g., width) along the second direction DR**2**. Each of the eighth and ninth adhesive layers **1811** and **1812** may have a length **18**-L**1** along the first direction DR**1** substantially the same as a first width **20**-L**1** along the first direction DR**1** of the cover film **2003**.

Each of the eighth and ninth adhesive layers **1811** and **1812** may have a width **18**-L**2** along the second direction DR**2** less than a second width **70**-L along the second direction DR**2** of each of the first and second plates **710** and **720**. In an embodiment, for example, the width **18**-L**2** may be about 10 millimeters (mm). However, the width **18**-L**2** is not limited to the example above, and may be variously changed based on product designs.

It may be defined that the cover film **2003** has a first length **20**-L**2** as a maximum dimension along the second direction DR**2**, and that the cover film **2003** has a second length **20**-L**3** along the second direction DR**2** at a partial region to which neither the eighth adhesive layer **1811** nor the ninth adhesive layer **1812** is attached. In the display device **1003** which is unfolded, the second length **20**-L**3** may be a maximum distance between the eighth and ninth adhesive layers **1811** and **1812**. The second length **20**-L**3** may be changed in response to deformation in shape of the display device **1003** of FIG. **7**.

In an embodiment, for example, the first length **20**-L**2** may be about 120 mm, and the width **18**-L**2** may be about 10 mm. In this case, the second length **20**-L**3** may be about 100 mm. The first and second plates **710** and **720** which are spaced apart from each other may define a gap **70**-G along the second direction DR**2**. The gap **70**-G may be about 750 micrometers (μm). When the display device **1003** of FIG. **7** is folded, a variation in the distance **70**-D of FIG. **4** between an end of the first plate **710** and an end of the second plate **720** may occur, at the end portion of the display device **1003**.

Referring to FIG. **4** and FIG. **7** together, for example, the display device **1000** which is folded, defines a folding curvature. In an embodiment, when a folding curvature is

about 2 mm, the distance **70**-D may define about a 4,000 μm change to a length of the cover film **2003**. In an embodiment, a difference of about 3.25 mm may be provided between the second length **20**-L**3** in the display device **1003** which is unfolded and the second length **20**-L**3** in the display device **1003** which is folded. The length variation of the second length **20**-L**3** may be about 3.25%. The second length **20**-L**3** may increase by folding of the display device **1003**, from the top plan view shown in FIG. **8**. The cover film **2003** may be elastic in response to the length variation.

Although not shown, the tenth adhesive layer **1813** of FIG. **7** may have a planar shape that corresponds to that of the eighth adhesive layer **1811**, and the eleventh adhesive layer **1814** of FIG. **7** may have a planar shape that corresponds to that of the ninth adhesive layer **1812**.

FIG. **9** illustrates a plan view showing the first plate **710**, the second plate **720**, a cover film **2004**, a thirteenth adhesive layer **1811-1**, and a fourteenth adhesive layer **1812-1**.

Referring to FIG. **9**, the thirteenth adhesive layer **1811-1** may include a first adhesive region **181**, a second adhesive region **182** and a third adhesive region **183**, and the fourteenth adhesive layer **1812-1** may include a fourth adhesive region **184**, a fifth adhesive region **185** and a sixth adhesive region **186**.

Each of the first and fourth adhesive regions **181** and **184** may extend along the first direction DR**1**. Each of the first and fourth adhesive regions **181** and **184** may have a length **18**-L in the first direction DR**1** that corresponds to a maximum length in the first direction DR**1** of each of the thirteenth and fourteenth adhesive layers **1811-1** and **1812-1**. The first and fourth adhesive regions **181** and **184** may correspond to the eighth and ninth adhesive layers **1811** and **1812** discussed above.

The second adhesive region **182** may lengthwise extend along the second direction DR**2** from a first end of the first adhesive region **181**, and the third adhesive region **183** may lengthwise extend along the second direction DR**2** from a second end of the first adhesive region **181** which is opposite to the first end thereof. The fifth adhesive region **185** may lengthwise extend along the second direction DR**2** from a first end of the fourth adhesive region **184**, and the sixth adhesive region **186** may lengthwise extend along the second direction DR**2** from a second end of the fourth adhesive region **184** which is opposite to the first end thereof. Along the second direction DR**2**, the second adhesive region **182**, the third adhesive region **183**, the fifth adhesive region **185** and the sixth adhesive region **186**, may each be disposed between the first adhesive region **181** and the fourth adhesive region **184**.

The cover film **2004** may have a first width **21**-L**1** along the first direction DR**1** less than the length **18**-L along the first direction DR**1**. The cover film **2004** may be selectively attached to the first and fourth adhesive regions **181** and **184**, and may be unattached to each of the second, third, fifth and sixth adhesive regions **182**, **183**, **185**, and **186**. In the plan view, the cover film **2004** may be disposed between the second and third adhesive regions **182** and **183**, and between the fifth and sixth adhesive regions **185** and **186**, along the first direction DR**1**.

Although not shown, the tenth adhesive layer **1813** of FIG. **7** may have a planar shape that corresponds to that of the thirteenth adhesive layer **1811-1**, and the eleventh adhesive layer **1814** of FIG. **7** may have a planar shape that corresponds to that of the fourteenth adhesive layer **1812-1**. In an embodiment, for example, the second and third adhesive regions **182** and **183** may be adhered to the tenth adhesive layer **1813** of FIG. **7**, and the fifth and sixth adhesive regions **185** and **186** may be adhered to the eleventh adhesive layer **1814** of FIG. **7**.

Referring to FIGS. **8** and **9** together with FIG. **7**, the cover film **2003** and the cover film **2004** are attached to the plate layer, at an ends of the plate layer which are furthest from the folding area FA. In FIGS. **3**, **5** and **6**, the cover film **2000**, the cover film **2001** and the cover film **2002** are attached to the plate layer at locations of the first and second plates **710** and **720** which are closest to the folding area FA.

According to one or more embodiment, a shape of a cover film **2000** may be deformed in response to a variation in gap **70**-G between first and second plates **710** and **720**. The cover film **2000** may cover at least a portion of a region between the first and second plates **710** and **720**. Therefore, entry of foreign substances into the gap **70**-G between the first and second plates **710** and **720** may be reduced or effectively prevented. As a result, a display device **1000** may have increased reliability.

Although embodiments have been described with reference to a number of illustrative examples thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made without departing from the spirit and scope of the invention as set forth in the following claims. Thus, the technical scope of the invention is not limited by the embodiments and examples described above, but by the following claims.

What is claimed is:

1. A display device, comprising:

a display module including a first region, a second region and a third region arranged in order;

a first plate corresponding to the first region of the display module;

a second plate corresponding to the third region of the display module and spaced apart from the first plate at the second region of the display module, to define a gap between the first plate and the second plate, at the second region;

a cover film which is extended across the gap and attached to the first plate and the second plate at a plurality of attachment regions outside of the gap; and,

a first intermediate adhesive layer, a first step compensation film, a second step compensation film, and a second intermediate adhesive layer in order, in a direction along the display module,

wherein the display module which is unfolded, disposes:

the first intermediate adhesive layer between the display module and the first plate and corresponding to the first region of the display module;

the first step compensation film between the display module and the first plate and corresponding to the second region of the display module;

the second intermediate adhesive layer between the display module and the second plate and corresponding to the third region of the display module;

the second step compensation film between the display module and the second plate and corresponding to the second region of the display module; and

the first step compensation film spaced apart from the second step compensation film at the second region of the display module.

2. The display device of claim **1**, wherein

the cover film comprises:

a first attachment region at which the cover film is attached to the first plate;

a second attachment region at which the cover film is attached to the second plate; and

a connection region between the first attachment region and the second attachment region, and

the display module which is unfolded, disposes the connection region including a plurality of bent portions corresponding to the second region of the display module.

3. The display device of claim **2**, wherein

the first plate and the second plate each include a bottom surface which is furthest from the display module,

the first attachment region of the cover film extends along the bottom surface of the first plate and is attached to the bottom surface of the first plate, and

the second attachment region of the cover film extends along the bottom surface of the second plate and is attached to the bottom surface of the second plate.

4. The display device of claim **2**, wherein the display module which is unfolded, disposes the plurality of bent portions of the cover film, in the gap between the first plate and the second plate.

5. The display device of claim **2**, wherein the display module which is unfolded, disposes along a thickness direction of the display device, the plurality of bent portions comprising:

a first bent portion between the first plate and the display module; and

a second bent portion between the second plate and the display module.

6. The display device of claim **2**, wherein the display module which is unfolded, disposes along a thickness direction of the display device, the plurality of bent portions comprising:

a first bent portion facing the display module with the first plate therebetween; and

a second bent portion facing the display module with the second plate therebetween.

7. The display device of claim **2**, wherein the display module which is unfolded, disposes:

the first plate including a side surface facing the second plate, and the second plate including a side surface facing the first plate, and

the cover film extending along the side surface of the first plate and along the side surface of the second plate.

8. The display device of claim **1**, further comprising:

a first adhesive layer between the cover film and the first plate; and

a second adhesive layer between the cover film and the second plate.

9. The display device of claim **8**, wherein the display module which is unfolded, disposes:

the first adhesive layer having a bar shape extended along a first direction, and

the second adhesive layer having a bar shape extended along the first direction.

10. The display device of claim **9**, wherein the display module which is unfolded, disposes:

each of the first adhesive layer and the second adhesive layer including a length along the first direction, and

the cover film including a width along the first direction,

wherein the length along the first direction is substantially the same as the width of the cover film, along the first direction.

11. The display device of claim **8**, wherein the display module which is unfolded, disposes:

the first adhesive layer corresponding to the first region of the display module, and

the second adhesive layer corresponding to the third region of the display module, and spaced apart from the first adhesive layer at the second region of the display module,

wherein

the first adhesive layer comprises:

a first adhesive region furthest from the second adhesive layer and extended along a first direction;

a second adhesive region extended along a second direction from a first end of the first adhesive region, the second direction intersecting the first direction; and

a third adhesive region extended along the second direction from a second end of the first adhesive region which is opposite to the first end thereof,

the second adhesive layer comprises:

a fourth adhesive region furthest from the first adhesive layer and extended along the first direction;

a fifth adhesive region extended along the second direction from a first end of the fourth adhesive region; and

a sixth adhesive region extended along the second direction from a second end of the fourth adhesive region which is opposite to the first end thereof, and

along the second direction, each of the second adhesive region, the third adhesive region, the fifth adhesive region and the sixth adhesive region are between the first adhesive region and the fourth adhesive region.

12. The display device of claim **11**, wherein the cover film includes a width along the first direction,

wherein the second adhesive region spaces apart from the third adhesive region by a distance along the first direction, and

wherein the width of the cover film is less than the distance between the second adhesive region and the third adhesive region.

13. The display device of claim **1**, further comprising a folding area at which the display device is foldable, and a non-folding area extended from the folding area:

wherein

the first region and the third region of the display module correspond to the non-folding area, and

the second region of the display module corresponds to the folding area.

14. The display device of claim **13**, wherein the display module which is unfolded, disposes:

the first plate corresponding to the first region of the display module and extending into the second region which corresponds to the folding area, and

the second plate corresponding to the third region of the display module and extending into the second region which corresponds to the folding area.

15. The display device of claim **1**, wherein

the display module which is unfolded is flat;

the display module which is folded disposes the first region and the third region facing each other;

the first plate is movable together with folding or unfolding of the display module;

the second plate is movable together with the folding or unfolding of the display module; and

the cover film is deformable together with the folding or unfolding of the display module.

16. The display device of claim **1**, wherein the cover film includes a flexible film.

17. A display device, comprising:

a display module which is foldable and unfoldable, the display module comprising:

a folding area at which the display module is foldable, and

a first non-folding area and a second non-folding area facing each other with the folding area therebetween;

a first plate corresponding to the first non-folding area of the display module, the first plate movable together with folding or unfolding of the display module;

a second plate corresponding to the second non-folding area of the display module and spaced apart from the first plate at the folding area to define a gap space therebetween, at the folding area, the second plate movable together with the folding or unfolding of the display module;

a cover film deformable together with the folding or unfolding of the display module; and

a first intermediate adhesive layer, a first step compensation film, a second step compensation film, and a second intermediate adhesive layer in order, in a direction along the display module,

wherein

the cover film covers the gap space which is between the first plate and the second plate and is attached to the first plate and the second plate at a plurality of attachments regions outside of the gap space, and

the display module which is unfolded, disposes:

the first intermediate adhesive layer between the display module and the first plate and corresponding to the first non-folding area of the display module;

the first step compensation film between the display module and the first plate and corresponding to the folding area of the display module;

the second intermediate adhesive layer between the display module and the second plate and corresponding to the second non-folding area of the display module;

the second step compensation film between the display module and the second plate and corresponding to the folding area of the display module; and

the first step compensation film spaced apart from the second step compensation film at the folding area of the display module.

18. The display device of claim **17**, wherein

the cover film comprises:

a first attachment region at which the cover film is attached to the first plate;

a second attachment region at which the cover film is attached to the second plate; and

a connection region between the first attachment region and the second attachment region, and

the display module which is unfolded, disposes the connection region including a plurality of bent portions corresponding to the gap space which is between the first plate and the second plate.

19. The display device of claim **17**, further comprising:

a first adhesive layer between the cover film and the first plate; and

a second adhesive layer between the cover film and the second plate,

wherein each of the first adhesive layer and the second adhesive layer includes a length along a first direction, and the cover film includes a width along the first direction, and

wherein the length along the first direction is equal to or greater than the width of the cover film along the first direction.

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